Washington Park Arboretum Bulletin

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Washington Park Arboretum Bulletin
Published quarterly by the Arboretum Foundation
for the Washington Park Arboretum

Washington Park Arboretum

The Arboretum is a 230-acre living museum displaying internationally renowned collections of oaks, conifers, camellias, Japanese maples, hollies and a profusion of woody plants from the Pacific Northwest and around the world. Aesthetic enjoyment gracefully co-exists with science in this spectacular urban green space on the shores of Lake Washington. Visitors come to learn, explore, relax or reflect in Seattle's largest public garden.

The Washington Park Arboretum is managed cooperatively by the University of Washington and Seattle Parks and Recreation; the Arboretum Foundation is its major support organization.

Graham Visitors Center

Open 10 AM—4 PM daily;
holidays, NOON—4 PM.
Closed Thanksgiving and the Friday after,
Christmas and New Year's Day.
The Arboretum is accessible by Metro bus #43 from downtown Seattle and the University of Washington campus

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The Arboretum Foundation is a nonprofit organization established in 1935 to ensure stewardship for the Washington Park Arboretum, and to provide horticultural leadership for the region. The Foundation provides funding, volunteer services, membership programs and public information in support of the Arboretum, its plant collections and programs. Volunteers operate the gift shop, conduct major fundraising events, and further their gardening knowledge through study groups and hands-on work in the greenhouse or grounds.

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ABOVE: *Garrya* x *issaquahensis (G. elliptica* x *G. fremontii)*, with its dark green foliage, glossy on top and soft and glaucous on the under side of the leaves, was found in the Issaquah garden of Pat Ballard in 1961. It features catkins of eight or nine inches and may be seen in the J. A. Witt Winter Garden.

ON THE COVER: This American holly, *Ilex opaca* 'Canary,' with its bright green leaves and abundant, yellow berries, will grow well in zones 5-9. In the Arboretum's remarkable holly collection, it may be found at map grid 5-4E.

Winter Inspiration

It is impossible to endure a winter in Seattle without confronting the reality of boots and umbrellas. And this winter, reality also demands that we both acknowledge and address the violence and suffering in our world.

But life is not whole without also acknowledging the world's restorative power and breathtaking beauty, even in winter, for there is little that is more uplifting than the surprising scent of witch hazel or fragrant winter honeysuckle. A lingering walk in the Arboretum's Winter Garden reminds us again of the privilege of enjoying this remarkable space and of the need to assure its survival in the years ahead.

Articles in this issue of the "Bulletin" honor a couple, who worked long ago to assure the very existence of the Arboretum, and the continuing enthusiasm of an Arboretum Unit. Donald G. and Juanita Graham supported both the dream and the reality of the Arboretum for over 70 years. And such support continues, for the voluntarism of many friends, including the "Sophisticated Amateurs" of Unit 39, is an inspiration.

So when the reality of change, such as the appearance in Seattle of Dutch elm disease, challenges your assumptions, remember to explore a recently revitalized winter plant destination. Visit the Volunteer Park Conservatory. Revel in its warmth. Then think about growing cacti and their companions, plants you may never have considered for your own home garden.

And on February 5, join us, once again, for the excitement of an early spring at our Preview Party before the opening of the newly enlarged Northwest Flower & Garden Show, "Growing Passion." We look forward to seeing you then and to thanking you for all of the ways you honor your Arboretum

Deborah Andrews

Deborah Andrews, Executive Director,
Arboretum Foundation

The violet fruit of the Japanese beautyberry, *Callicarpa japonica*, is most abundant in fall. Icy berries that remain through the winter may provide only fleeting charm, unless captured by the photographer's lens.

PHOTOS BY LYNNE HARRISON

Above: Even an awkward, basalt rockery can be camouflaged with creative planting: Hinoki cypress, *Lonicera nitida* 'Baggesen's Gold,' *Euphorbia characias*, and *Caryopteris* x *clandonensis* 'Worcester Gold' provide color all winter. **Below:** The entrance is framed by *Ilex crenata* 'Sky Pencil' and the dry, warm brown of Japanese blood grass.

COMBINATIONS UNLOCKED

The Whys & Wherefores of Favorite Plant Combinations

2: Conifers are King

BY BOB LILLY

Many Seattle-area neighborhoods include homes with original, unreconstructed rockeries piled with weird, dark gray basalt from an early Skykomish quarry. There is nothing like a good, old conifer to hide these rocks and their odd angles and aspects. Furthermore, conifers look great the year 'round.

Several years ago, Madelyn Katzman and I were charged with taking one of these steep rockeries apart and putting the stones back in an arrangement with large planting spaces, disguising the rocks and screening the front garden from the sidewalk. The only plant remaining after we dismantled and reconfigured the rockery was a sizeable Hinoki

PHOTO BY LYNNE HARRISON

The winter color of the twiggy, coral bark maple (*Acer palmatum* 'Sango-kaku') both complements the evergreens and enlivens the home's warm, red brick and white stucco façade.

cypress (*Chamaecyparis obtusa).* Our goal with the remaining rockery: to combine winter and summer aspects for interest all year.

To achieve this goal we used a bit of Mugo pine, *Lonicera nitida* 'Baggesen's Gold,' *Chamaecyparis obtusa* 'Fernspray,' and, for drama, *Euphorbia characias*, which gets heavy pruning after flowering. It has lasted well here for five years but will need to be replaced with a younger plant soon; it is a bit woody at the base. In spring, these evergreens are joined by the gold-leafed branches of *Caryopteris* x *clandonensis* 'Worcester Gold,' which remain as twigs all winter.

Although the *Caryopteris* needs a bit more tending than the other plants included here, its golden foliage in summer keeps the color theme going, complementing the foliage of the Lonicera which remains good and gold all summer, thanks to root stress caused by the large Hinoki cypress. We have planted very tightly in this garden, so as to create an established look quickly, but it also requires more pruning to keep each element in its place and properly proportioned.

When visitors walk up the steps between sections of rockery, they find themselves in a front garden with a wide, square stone walkway flanked by two small, upright hollies (*Ilex crenata* 'Sky Pencil'), used as an exclamation points here as well as an organic gate to this section of the garden. On the left, behind the tawny, winter-browned Japanese blood grass (*Imperata cylindrica* 'Rubra') is one of the fantastic cultivars of *Cryptomeria japonica*, sturdy and slow-growing.

In the background is a dense screen of gray-green *Elaeagnus pungens*, a broad-leafed evergreen that is a bit too vigorous for this situation but which complements the richer green of the Italian cypresses (*Cupressus sempervirens*), used in a group of three along with another single columnar conifer, *Pinus strobus* 'Fastigiata.'

On the right is a favorite rhododendron moved from the owners' previous garden. Behind this small year-'round garden is a large group of existing lilacs that make a tracery against the winter sky. In the center of the garden, as a focal point, is a single witch hazel (*Hamamelis* x *intermedia* 'Arnold Promise'). Mixed in with the conifers are a variety of deciduous shrubs providing winter and spring interest through twig color or early flowers.

In choosing columnar shapes, we tried to echo the form of the tall evergreens in the distant, very "borrowed" landscape. The subtle, repeated colors of winter and early spring, provided by the pine, holly and cypress combination, disappear with the changing colors of summer.

Madelyn and I get to see this garden every month as we continue to care for it as it matures. It is a challenge to keep the mixed conifer and deciduous screens balanced and within the planned scale. The use of these evergreens has provided a solid, established look that anchors the hardscape and provides colorful, winter interest. In using the smaller growing conifers in our gardens we have the great fun of echoing in miniature the Arboretum itself in color, texture and shape. ~

Bob Lilly is co-chair of the Northwest Perennial Alliance, is an Arboretum Foundation Board member, and is co-chair of the Foundation's spring plant and fall bulb sales. He may reached at (206) 324-0179.

HORT 101

Test your horticultural vocabulary with these terms used in this issue!

AREOLE, (âr´ ē ōl´), noun

A sunken cushion representing a condensed lateral shoot from which spines, branches, and flowers arise in cacti.

BRACT, (brakt), noun

A specialized leaf-like plant part situated below a flower or inflorescence. Some plants with insignificant flowers, such as poinsettias, have brilliantly colored bracts to attract pollinators.

EPIPHYTE, (epə´ fīt), noun

An epiphyte (Greek: *epi*, upon; *phytum*, plant) spends its life using another plant for support. The roots of EPIPHYTIC plants, such as tropical orchids, are usually designed for grasping the branches of host trees.

ETHNOBOTANY, (eth´ nō bot´n ē), noun

The systematic study of the plant lore and agricultural customs of a people as well as the plant lore and customs themselves.

GLOBOSE, (glō´ bōs, glō bōs´), adj.

Having the shape of a sphere or globe. *Escobaria* cacti are often formed of clusters of small, spiny, globose, spheres.

MAMMILLARY, (mam´ə ler´ē), adj

Having a breast or nipple-like shape or protuberance.

OBOVOID, (ob ō´ void), adj.

Having a shape that is inversely ovoid, that is, egg-shaped with the narrow end at the base and the broad end at the apex.

PHEROMONE, (fer´ a mōn), noun

A chemical signal or scent emitted by insects and other species as a means of communication. Many insects use pheromones to attract mates.

SAPROPHYTE, (sap´ rə fīt´), noun

An organism that lives on dead organic matter. Saprophytes are essential to the decomposition of organic matter and actually improve soil fertility by returning nutrients back to the earth.

VERTICILLIUM WILT, noun

A widespread, destructive fungal disease, verticillium wilt can live in the soil for years, even without host plants, and can affect a variety of plants, including tomatoes, roses and some trees, by invading and plugging their water-conducting tissue (xylem).

XYLEM, (zī ləm, lem) noun

The water-conducting tissue of vascular plants. Xylem moves water and nutrients only in an upward direction.

Further explanation of many of these terms and others of interest to our readers may be found in "Botany for Gardeners: An Introduction and Guide," written by Brian Capon and published by Timber Press.

It's Here: Dutch Elm Disease

By Katherine Van Pelt

Dutch elm disease was identified in Seattle for the first time late last summer, causing quite a stir among local tree lovers. Although the public was shocked, local arborists knew it was coming. That doesn't mean we are well prepared to deal with the problem; prevention and control are complicated and expensive, and there is no cure.

The Carrier

In western Washington, Dutch elm disease (DED) is spread by the smaller European elm bark beetle, *Scolytus multistriatus*. There is no record of when this beetle arrived in western Washington, but Robert Coen, Jr., a University of Washington entomology student, found it in Seattle in 1983, producing three generations per year. At that time, the beetles were not carrying DED. The over-wintering generation emerged in mid-May to early July, peaking in mid-June. The heaviest peak population in 1983 was the second generation (peaking early August). The third peak was the smallest, about September 15. Beetles continued to be active until October 13.

Elm bark beetles have evolved with DED; they spread the disease, and it provides them with freshly killed wood where they can breed. Beetles can detect the odor of stressed trees, but first they must be very close by. When a female beetle finds a good breeding site, she produces very strong pheromones that attract large beetle invasions. Limbs that have been dead for one to several months are not used

PHOTO BY KATHERINE VAN PELT

Diseased elm showing classic flagging pattern caused by DED.

by smaller European elm bark beetles; they use freshly killed, freshly cut, or suddenly weakened wood. Beetles lay their eggs in vertical grooves under the bark of sick or recently killed elm wood. When the eggs hatch, the larvae tunnel perpendicularly to the egg groove, making a pattern like a long-legged millipede. There can be more than one million elm bark beetle larvae in a single tree.

When the larvae reach adulthood, they exit through the bark and fly away. The larvae may pick up the sticky DED spores from their parents or from the infected wood where they hatched. They feed on the fresh bark of healthy two-to-four-year-old elm twigs, munching tiny grooves into the twig forks. If the beetles scratch the xylem while they are feeding, they can introduce DED to the tree. Between one and 50 percent of elm bark beetles carry the disease. These bark beetles can fly up to six or 12 miles (depending on the information source) in search of food or breeding sites.

Ophiostoma ulmi: A Fungus

DED itself is a fungus, *Ophiostoma ulmi* (also known as *Ceratocystis ulmi*), which only affects plants in the elm family. The disease is native to Asia and was first exported via live beetles in elm-wood packing crates. It is called Dutch only because a Dutch scientist first identified and described the disease. Fungal spores are carried into a tree on the bodies of elm bark beetles; researchers have been unable to infect trees through airborne or tool-borne spores. The fungus develops first as yeast-like cells that can be carried in the sap stream. Because they infect the xylem, they move upward more easily than downward. Typically, symptoms show in a tree's crown within weeks of inoculation by DED.

A tree is killed after the fungus moves down to the roots. Elms are most susceptible in spring, when large diameter xylem is close to the surface. The disease can survive as a saprophyte in dead wood as much as 20 months after cutting. The fungus spreads through the tree's conductive tissues, but it is the tree's own reaction to the fungus that is fatal. Trees form plugs called tyloses to prevent the spread of infection. In reaction to DED infection, most elms produce enough tyloses to actually shut down their own vascular systems.

Dutch Elm Disease in Tacoma

The City of Tacoma first identified DED on two adjacent street trees in Tacoma's central historic district near Wright Park in July of 1995. DED had already killed a State Champion English elm in Puyallup, and one tree in Wright Park was affected, but before July of '95 we were not familiar with the symptoms. What we saw was one elm with all of the leaves on two or three branches turned orange-brown; the neighboring tree had one such branch. By the end of August, both trees were dead. We took samples from both trees to be tested at the Washington State University Puyallup Research and Extension Center; one of them was confirmed infected with DED, and the other was not. When we visited both trees again, we saw the tiny exit holes of the smaller European elm bark beetle on both trees and caught several live beetles. Since then, we have learned several things:

✦ First, the die-back pattern varies widely. Generalized tip dieback can be caused by DED, and on such trees we rarely see any of the characteristic "flagging" (an entire branch dying at once) but rather a progressive sparseness overall. On those elms prone to whisker-like suckers on the trunk, we often see sucker-browning as the first symptom of DED infection.

✦ Second, having branch samples tested cannot tell you that a tree is free of DED. The test results are either "positive" or "not positive." "Not positive" means the sample did not grow an identifiable colony of DED fungus when cultured in the laboratory. The size and

condition of the sample, the stage of disease progression and the life cycle of the fungus can all affect test results. We watched one elm die of classic DED symptoms, including bark beetle infestation, while three separate attempts to culture samples over the summer all failed to confirm DED.

✦ Third, Siberian elms (*U. pumila*) are not immune to DED, but they are resistant. In June of 1998, I noted three Siberian elms

Caring for Elms at Washington Park Arboretum

By Christina Pfeiffer

The Arboretum collection contains about a dozen species and cultivars of elms, including American elm (*Ulmus americana*), English elm (*U. procera*), smoothleaf elm (*U. carpinifolia*), Japanese elm (*U. japonica*), slippery elm (*U. rubra*), and a very popular pair of Camperdown elms (*U. glabra* 'Camperdownii').

Diseased elm on University of Puget Sound campus, showing overall sparse crown foliage caused by DED.

Other members of the elm family in the collection are Zelkova, and hackberry (*Celtis*). Elms primarily are located west of Arboretum Drive E., between the Visitors Center and the Winter Garden; near the old nursery east of Arboretum Drive; and west of Lake Washington Boulevard north of Boyer Avenue.

We have been watching our trees closely over recent years. To date, we have not seen any evidence of Dutch elm disease.

With news of the disease's arrival in our immediate area, we treated our susceptible elms with Dutch Trig on July 9, 2001 (see Van Pelt article). This was done (in conjunction with the treatment of trees on the University of Washington campus) by Dave Mausel, pest management coordinator for the campus and College of Forest Resources graduate student in entomology. Mausel notes that the experimental data on Dutch Trig treatments in the southeast United States have shown good success, and he is hopeful it will be a good management tool here as well.

Arboretum staff arborist Lou Stubecki has training and experience in managing Dutch elm disease, largely from his work experience in New York and Chicago where the disease has been prevalent. He monitors our trees each summer for symptoms. Pruning is done in the winter months prior to April, or in September, to avoid the spring and summer flight period of the vector beetles attracted to fresh pruning wounds.

The Arboretum employs a holistic approach to managing plant health problems, combining the use of carefully timed, least toxic controls, cultural practices to improve plant vigor, and the removal of severely affected plants beyond restoration. Arboretum staff members keep up-to-date in training, disease development in our area, and treatment options, to provide the best possible conservation of the Arboretum's collection.

Christina Pfeiffer is the Horticulturist for the Washington Park Arboretum.

PHOTOS BY KATHERINE VAN PELT

Diseased elm with apparently healthy branches, but water sprouts on trunk are flagging

Two of the first elms in Tacoma with DED, July 1995. Both of these trees were completely dead by the end of August

showing severe flagging. When I checked back in July, all three were fully green again. On closer inspection of the most accessible of the three, there was quite a bit of dead wood within the crown that was riddled with bark beetle exit holes.

✦ Fourth, elm bark beetles are hard to find. The first two DED-infected trees we found had hundreds crawling around at eye level, but I have never seen live beetles since. Evidence of beetle infestation is most often found high in the crown.

✦ Fifth, positive identification of DED infection in a sick elm is unnecessary. Bark beetles breed in any sick or recently killed elm wood, so sick or dead elms need to be removed and destroyed regardless of what damage or disease is responsible.

Learning from Others' Experience

The experience of communities in the central and eastern United States shows that intensive sanitation to control the spread of DED is considerably less expensive than ignoring it and removing dead trees. Those communities that make a practice of regular elm inspections, pruning out dead or diseased wood and promptly removing infected trees can keep their elm losses to less than 3 percent per year. Unchecked, DED typically kills 10 to 20 percent of the original population per year; most elms within an area will be dead within 10 to 15 years.

One elm researcher thought we were lucky out West, where almost all of the elms are planted rather than native; he felt this would allow a thorough elm inspection and management program at much lower cost than in the Midwest. Unfortunately, the small scale of our elm population works against us. It is difficult to justify the cost of such an intensive management program for a tree that is far less than 1 percent of our tree population, particularly since most communities in the Western United States do not fund even the most basic public tree care.

However, the majority of our elms were planted early in this century and are very large; most are in parks or on street rights-of-way. Tacoma has a larger percentage of elms than other communities in the state, including five

of the 25 living elms listed in Robert Van Pelt's *Champion Trees of Washington State.* Nolan Rundquist, Seattle's City Arborist, says that elms are less than 0.5 percent of Seattle's street tree population, but they make up about 18 percent of Seattle's larger street trees (over 24 inches in diameter).

Tacoma's Experience

The City of Tacoma decided to use city funds to remove all sick or dead elms in Tacoma, regardless of ownership, starting in 1996. Given the cost of large tree removal and proper wood disposal, we felt the best way to ensure homeowner cooperation was to absorb the cost ourselves. In 1996 and 1997, we removed 33 infected trees. In 1998 and 1999, we removed 132. By 1999, we had already spent much of our 2000 budget, and the disease had accelerated beyond our means to manage it. Altogether, the City of Tacoma and the Metropolitan Park District of Tacoma have removed and disposed of 232 elms on

Dutch Elm Disease Facts:

Identification:

The smaller European elm bark beetle is about an eighth of an inch long, with a shiny black head and shiny reddish-brown body. It is most likely seen crawling on the bark of sick or recently killed elm trees between May and October. There will be tiny holes in the bark where the beetles emerged.

Symptoms of infected trees include wilting and yellowing of leaves, or dying branch tips. This may begin on one or a few branches and then spread throughout the tree. Infected branches may have brown or black streaks under the bark (a ring of spots in cross-section).

The only way to be sure that a tree has DED is to take samples to a diagnostic laboratory. There they will be cultured until the fungus matures and can be identified. Any sick or dead elm wood attracts bark beetles. **No matter what caused the problem, any sick or dead elm wood must be destroyed promptly.**

Prevention:

All root grafts should be severed between elms. DED travels rapidly once it reaches the root system, and it can move from tree to tree through the natural grafting of roots of adjacent elms of the same species.

Arbotect® fungicide has a very high success rate in protecting elms from infection. This treatment is very expensive and causes wounds in tree trunks, but it is an excellent tool for preserving valuable elms.

Various injectable fungicides containing propiconazole are registered for control of DED, but Rainbow Tree Care of Minnesota, a leader in elm care, has found propiconazole not nearly as effective as Arbotect®.

A vaccine called Dutch Trig has been developed in the Netherlands and is being tested for use in the United States. This is a strain of verticillium wilt that seems to defend the tree against DED infection, and tests show a very high success rate. This material needs to be injected every year, but it is less expensive than Arbotect®.

Another product, developed at the University of Toronto, is called ELMguard. The developer claims this product stimulates a tree's own natural defense

public and private property since 1996; 189 were infected with DED. Currently, only 462 elms remain in parks or street rights-of-way, and approximately 1,000 more elms exist on private property, citywide.

While we have given up trying to manage Tacoma's elm population, we have not given up on our elms. Elms as a population include large numbers of poor to mediocre quality trees, so we have shifted our emphasis to only those elms that are on public property, have good form and are valued by the people around them. In the summer of 2001, we injected 17 very fine elms with DED-preventive fungicide; we will remove fourteen infected trees this fall, and we are developing ways to inform elm owners and tree workers about DED and the proper care of elms. ~

Katherine Van Pelt is the Urban Forester for the City of Tacoma and may be reached at kvanpelt@ci.tacoma.wa.us.

mechanisms, but no published data to support the claim have been found.

Control:

The best known control for DED is area-wide sanitation. The purposes of sanitation are to remove or reduce the sources of fungus and to reduce the numbers of insect vectors available to spread the fungus.

Any sick or dead elm wood (whether or not infected with DED) can become a breeding site for the elm bark beetle. Frequent inspection is important to spot dead trees and signs of DED infection. In early spring and summer, rapid response is essential. In late summer or fall, timing is less important—wood must be destroyed before beetles emerge in spring. Beetles and fungus reproduce in dead or dying parts of otherwise healthy trees, including resistant trees, so all sick or dead elm wood must be promptly removed and destroyed. Cut elm wood with bark on it must be burned, buried or chipped to eliminate bark beetle habitat. Smaller European elm bark beetles can breed in wood as small as two inches in diameter. Wood may be saved for woodworking or firewood if all bark is promptly removed. Stripping bark from cut elm wood prevents beetle breeding and kills immature larvae. Beetles can emerge during transport and storage of infected wood.

Pruning diseased branches is known to be effective as control only when less than 5 percent of the tree is affected and the pruning is performed immediately after the disease is spotted. Rainbow Tree Care of Minnesota uses a procedure called tracing, in which an infected branch is pruned and the surface wood on the trunk below the branch is removed to two inches deep, to 10 feet below where the characteristic staining of DED ends.

Most of the elms in Tacoma are Siberian elm (*Ulmus pumila*), English elm (*U. minor*), Scots elm (*U. glabra*) or American elm (*U. americana*). Most of the elms killed by DED so far in Tacoma were English or American elms. Scots elm is listed by some as less susceptible, and it has, thus far, mostly escaped infection in Tacoma. Asian elm species—Siberian elm, Chinese elm (*U. parvifolia*), and several uncommon species—are said to be DED-resistant to varying extents, and these are used by breeders to develop DED-resistant American elm hybrids. DED also is said to affect other trees in the elm family, such as *Zelkova* or *Celtis* (hackberries) species, but so far, we have not seen non-elms with DED. ~

PHOTOS COURTESY OF UNIT 39

Golden Jubilee: Ann Hauberg, Georgia DeCamp and Lucy Mitchell (left to right) at the 50th anniversary celebration at the Arboretum, in 1996.

Sophisticated Amateurs

ARBORETUM FOUNDATION UNIT 39

BY BRYAN TAULBEE

...But over the years,
As our hair has turned gray,
We still get together
for this Garden Day...

From the 50th Anniversary "Ode to Arboretum Amateurs," by Lee Clarke

Shouldn't every family have a grande dame, a seasoned lady rich with history, wisdom and character?

In Washington Park Arboretum's extended family, that lady is quite likely the Arboretum Foundation's Unit 39, a volunteer group unfailingly dedicated to supporting the Arboretum since 1946.

Also called Arboretum Amateurs, Unit 39 has active charter members and is known for long-lasting friendships and a get-the-job-done approach to fundraising

New Century Women: A gathering at the home of Betty Wood, April, 2000. Rear: Betty Wood, Kathryn Bowden, Mary Pinkham. Front: Betty Amick, Elma Arndt, Georgia deCamp, Ruth Trubner, Mary Lou Thomas, Aileen Anderson, Louise Beeman. Kneeling: Frances Ross (left to right).

and gardening projects. Members gather monthly for Unit meetings and continue to volunteer—beyond the call of duty—at the Arboretum gift shop, Pat Calvert Greenhouse (named for a Unit 39 member), Graham Visitors Center lobby and elsewhere.

"We've had the pleasure of doing many wonderful things over the years," says Lucy Mitchell, the current secretary, "but our involvement with Arboretum plant sales and winning the gold medal in Seattle's first flower show are certainly some of the most memorable ones."

A tour of the Arboretum's Japanese Garden in the 1980s:
Mary Lou Thomas, Anne Willard, Jacque Moran, Judy Rouzie, Lee Clarke,
Bea Wilkinson and Nukie Fellows (left to right).

Here's to over five decades of friendship, learning and volunteerism in support of Washington Park Arboretum—and to the grand ladies of Unit 39!

Amateurs' Miscellany:

✦ Unit 39 was among the early formed Arboretum Units and was the first to begin in the post-World War II era. Organizers included Frances Backus, Kitty Palmer, Dorothy Schwager, Helen Clarke and Agnes Zinn. Annual dues were $3.

✦ Unit 39 members were among the leaders of the legendary Arboretum plant sale, in past decades an all-volunteer effort. Members volunteered as "department chairs," with beginning-to-end responsibility for selecting, buying, transporting, displaying and selling plants.

✦ In the early years, members were required to present brief lectures on Arboretum plants. Members' desire for knowledge prompted the start of horticultural classes at the Arboretum.

✦ Prospective members attended a get-acquainted luncheon before being invited to join the ranks. "It was a catered, sit-down, lunch, mind you," says long-time member Jeannine Curry.

✦ The Amateurs' two early "godmothers" were Mrs. Arthur Krauss and Mrs. John Blackford, sophisticated gardeners who guided the young Unit 39 members.

Bryan Taulbee is Communications Coordinator for the Arboretum Foundation.

At the home of Mary Barnard Blanchard, near Port Townsend, in 1970: Mary Pinkham, Marguerite Cutting, Ruth Perkins, Dorothy Schwager, Kitty Palmer, Jerry Fisher (left to right).

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By Kimberly Mills

This past spring was a time of enormous emotion—the highest of highs, the lowest of lows—in Seattle's horticultural community.

After seven tumultuous years of vision and revision, the master plan to refurbish Washington Park Arboretum for the 21st century and beyond was adopted.

Then, on May 21, the celebration was muted, jarringly so, by a $3 million fire at the Center for Urban Horticulture, started by unknown arsonists, later identified as members of the Earth Liberation Front.

With area plantspeople reeling, still another blow fell. On May 24, at the age of 103, Juanita Fisher Graham died at her home in Broadmoor, adjacent to the Arboretum which she and her late husband, Donald G. Graham, had nourished since its earliest days in the mid-1930s.

Years of Work & Patience

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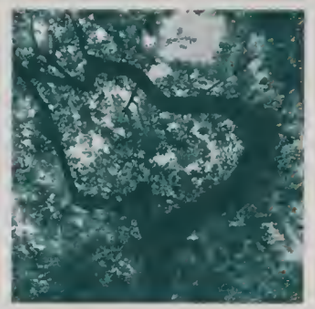

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Above: The dramatic, chartreuse green flowers of *Euphorbia characias* subsp. *wulfenii*, first introduced to Northwest gardeners by Donald G. Graham.

Left: A garden wall of ferns and a wrought iron railing lead visitors to the upper garden.

of the Grahams, it is quite possible that without them, the Arboretum might not have come into being at all.

Such was the uncertain state of affairs in the late 1920s and early 1930s. Around the turn of the prior century, the Arboretum had been created on the grounds of the University of Washington, largely at the instigation of UW President Henry Suzzallo. Then it was rendered homeless by the staging of the Alaska Yukon Pacific Exposition and the development of a campus golf course.

In the 1930s, when the country was firmly in the grip of the Great Depression, the Arboretum was a dream with a location but little else. In the eyes of people like Donald G. Graham, O.B. Thorgrimson and Hugo A. Winkenwerder, the Dean of the UW College of Forestry, it was fitting that the dream materialize at Washington Park, a long, narrow property bordering Broadmoor on the west, which had been selected in 1924.

The site wasn't much to behold—a regenerated thicket of red alder, big leaf maple, vine maple, dogwood, willows and cottonwood against a backdrop of hemlock, cedar, Douglas and grand firs.

By 1934, when the Seattle Board of Park Commissioners formed a committee to recommend a governance structure for the would-be arboretum, Donald Graham had been "an outstanding leader" in the movement for more than 30 years, according to Henry Schmitz in "The Long Road Travelled," an account of forestry endeavors at the University. (Arboretum Foundation, 1973)

"Without detracting at all from the contributions made by a large number of people it is perhaps reasonable to say that without the undeviating devotion of Dean Winkenwerder and Mr. Graham there would not be a University of Washington Arboretum today," Schmitz concluded.

In short order, Graham, a prominent attorney, was named chairman of the Arboretum advisory council. It soon evolved into the Arboretum Foundation, the third component of Arboretum leadership modeled after Arnold Arboretum at Harvard University. In time Graham was elected to two stints as Foundation president, in 1941–42 and in 1962–64, and served as a board member almost continuously in the intervening years.

"...it is perhaps reasonable to say that without the undeviating devotion of Dean Winkenwerder and Mr. Graham there would not be a University of Washington Arboretum today."

Donald Graham, Plantsman

Formal titles aside, Graham was a magnanimous contributor to—in fact, he no doubt helped launch—some of the Arboretum's prized collections. Arboretum accessions records show the Graham family name popping up over and over again; of the roughly 100 trees and shrubs donated (mainly in the 1940s and 1950s), about two-thirds are still on the grounds.

Much of what Graham contributed, so critical at a time when the city and state had precious little money for a plant playground, reflected his devotion to flowering shrubs, from rhododendrons and azaleas to magnolias and camellias.

Not content to grow in his own spacious garden just what was in fashion in Seattle at the time, Graham began importing plants, including species rhododendrons from China and hybrids from England. His rhododendron collection numbered more than 500 varieties at its peak. It's no wonder he was an early member of the American Rhododendron Society and helped organize its Seattle chapter.

Among the choice trees Graham established in his semi-formal English woodland garden are some that have only now become widely popular, such as the katsura tree (*Cercidiphyllum japonicum*) and *Magnolia sieboldii*, and some that still aren't popular but should be, like *Rhododendron augustinii* and *Magnolia hypoleuca*.

It was his hope that flowering trees such as these and the eucryphias he acquired from England would "help to achieve what many gardeners aspire to: a garden with succession of bloom using only trees and shrubs," he wrote in *The Arboretum Bulletin* in the summer of 1952.

Even away from Seattle, while serving a second stint in the military as a pilot in World War II, Graham managed to make a substantial impact on the still-fledgling Arboretum. Having met Brian Mulligan at the de Rothschild estate at Exbury, England, where he went to learn more about hybrid rhododendrons, Graham convinced Mulligan of the opportunity that awaited him in the Pacific Northwest. Mulligan began as Arboretum Director John Hanley's assistant, but after Hanley retired a few months later, was elevated to the position he would hold for the next quarter-century.

Juanita Graham's Gifts

It was also in this period that Juanita Graham's horticultural interests began expanding beyond her husband's. At his suggestion, she started cultivating chrysanthemums in the family greenhouse while he was in England. According to family lore, as repeated by Donald Graham, Jr., his mother apprenticed herself to a local florist and became so proficient with chrysanthemums in a few months that she won 37 ribbons and even top prize at a flower show in Victoria, British Columbia.

In the family, Juanita Graham's role was "housekeeper of the garden," her son recalls,

"nature being a bit messy." (As evidence that Donald Graham was a hands-on gardener, his son recalls that a garden visitor once mistook his father for the gardener because he was dressed in old clothes.)

For years after her husband died in 1972 Juanita Graham remained active in horticultural circles. Early on, when her husband had been consumed with getting the Arboretum under way, she made significant contributions of her own. Besides being the first membership chairman of the Foundation, she organized the Units, modeling them after the guilds at Children's Orthopedic Hospital, a charity she also served.

Vital still at age 87, Juanita Graham agreed to serve as co-chair of the fundraising drive to build a visitors center at the north end of the Arboretum. It was dedicated, appropriately so, in honor of her husband in 1986. Fellow Foundation members remember with fondness her faithful practice of sending her gardener to the annual Arboretum plant sale with flats of *Euphorbia characias* subsp. *wulfenii*, which her husband had imported long ago from England.

When Juanita Graham first contributed the plants with the bluish-green leaves and striking round heads of chartreuse green flowers, they were "pretty dramatic and exotic," Elizabeth Moses noted.

By the 1980s and 1990s though, they weren't as rare, Jean DeFriel Gardiner said with a chuckle, explaining that the clerks at the sale would have to wait until the Graham gardener went home to reduce the price.

Today, the Graham family legacy continues to support the Arboretum and all its activities. Donald and Juanita Graham's grandson Fred A. Graham is an active member of the Arboretum Foundation Board of Directors.

Kimberly Mills wrote the "Washington Park Arboretum Guidebook" and enjoys being an Arboretum guide.

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Arboretum Foundation

PHOTO BY DAVID BLYTHE

View of the Conservatory with a lush carpet of bright red nicotiana welcomes visitors on even the grayest of days!

WARMTH FOR WINTER WANDERING:

The Volunteer Park Conservatory

By Holly M. Redell

"Everything has come back beautifully since the renovation of the Palm House," says Stephanie Johnson-Toliver, Senior Gardener at the Conservatory in Volunteer Park. "We even expect fruit on the banana tree." She is referring, of course, to the towering banana in the center island of the Palm House, the first thing you will see on the other side of the arched doorway to Seattle's crystal palace. Originally built in 1912, the Palm House restoration was completed in 1999 with the replacement of its roof.

But before you cross the threshold, look up, for a moment, at the etched, stained-glass canopy called "Homage in Green." Commissioned in 1982 by the Friends of the Conservatory, this artwork, by Richard Spaulding, traces 300 years of architectural ornamentation as it stretches across 35 separate panels of glass; it is a wonderful prelude to the newly restored structure.

Indeed, an almost mystical change takes place as you cross the scant few feet into the

Conservatory. The light flatters, and the air becomes at once palpable and redolent with the scent of thousands of plants. Voices hush, footfalls on the lighted paths soften, jangled nerves untwine in this paradise. It is an excellent Seattle winter destination.

The Conservatory, supported by the Seattle Department of Parks and Recreation and the private Friends of the Conservatory, formed in 1978 to rescue the aging structure, is a contained, controlled system of five separate climates. The central area is, of course, the Palm House. The houses to the east hold the seasonal collection and the cacti and succulents; and the two houses to the west comprise the fern and bromeliad collections.

Orchids

Winter in the Conservatory begins with orchids in the Palm House. The display usually includes close to 900 orchids representing 30 to 40 genera. Continuing throughout the winter, the orchid collection, originally presented to the Conservatory by Anna Herr Clise in 1920, features the big corsage orchids (*Cattleya* species), the moth orchids (*Phalaenopsis*), and cymbidiums in amazing variety. Look for colors, shapes, and sizes that will astound you, from tiny petals, that look like seahorses, to extravagant splashes of ruffle-edged flowers that will take you right back to your senior prom!

Once your orchid appetite has been sated, notice the collection of palms in the center island: the mighty, 40-year-old staghorn fern (*Platycerium bifurcatum*) on the north wall above the doorway, the abundant anthuriums along the outside of the pathway, and the many varieties of tropical bamboo.

Ferns

Moving west into the Fern House, you will find an exotic, tropical atmosphere created with hibiscus, baby's tears (*Soleirolia soleirolii*),

papyrus (*Cyperus alternifolius*) and maidenhair ferns (*Adiantum* species), all surrounding a delightful pond under a canopy of Mexican breadfruit (*Monstera deliciosa*). In late winter to early spring you will perhaps see the pendulous and fragrant flowers of the dramatic angel's trumpets (*Brugmansia arborea*). New this year, thanks to Courting Frogs Nursery, is an expanded collection of carnivorous plants around the pond. These plants are a special attraction for children who seem fascinated by their unusual appetites. The pond is full of coins. "There are many wishes in there," says Johnson-Toliver, "and they translate into building a better plant collection for the Conservatory."

Look for the hibiscus to show their stuff in brightly colored single and double inverted trumpets; then notice the deep-veined wings and delicate flowers of the begonia collection. Finally, make note of the unique cycads (*Cycas* species), known as dinosaur food because their soft and delicate new growth centers are thought to have been food for dinosaurs. These plants have changed little since prehistoric times.

Bromeliads

Approaching the Bromeliad House, you will actually be beckoned in by the thick, wood trellis, warm from the humid atmosphere, and by the gentle tinkling of an Over 'Lyre. This delicate artwork is a kinetic instrument made by artist Dan Senn; it was installed in May, 2001. Its music is made by a series of small cymbals on a steel grid and is activated by audio frequency.

The bromeliad collection has grown tremendously in the last several years, and late fall through winter is actually the time when their blooms are at their lavish best. The very colorful "leaves" of these epiphytes are actually bracts which present the rosette that, although it would appear to be the flowering part of the plant, actually contains or supports the tiny blooming flowers. Again, because bromeliads include both unusual varieties, such as ant plants, and familiar ones, like pineapple, this is another fascinating part of the collection for children. They will also enjoy the dramatic bird of paradise (*Strelitzia reginae*) that sends forth long-lasting, orange, bird-beak flowers.

The Conservatory, in fact, is an ideal winter destination for school children, especially during winter break. With a week's notice, a docent can be on hand for groups of about twelve.

Seasonal Displays

Returning to the Palm House and continuing eastward, you will enter the cooler Seasonal House, home to a collection of lavishly beautiful hydrangeas, azaleas and cyclamen, with additional poinsettias in early winter and 8000 forced daffodil and tulip bulbs displayed right after the holidays and into the new year. There is no more comforting spot for those of us yearning for spring.

Cacti

Preparing one for the next wing, the Cactus House, is the large and venerable jade tree (*Crassula ovata*), between 120 and 130 years old, that is placed just inside the entrance. It puts out little puffs of pale pink flowers starting in December and continuing through January.

Growth in the warm, arid Cactus House is in a dormant phase during late fall, with blooming beginning again in February and March. What is so attractive in winter is that the cacti and succulents form a living sculpture garden. Here at the east end of the building, the light changes as if to provide natural spotlights for the collection. You may notice some new plants here, made possible because the Conservatory is one of three rescue centers in the Puget Sound region, designated by the Department of the Interior's Fish and Wildlife Rescue Program.

CONSERVATORY PHOTO

These large *Opuntia* with headresses of yellow are two examples of the unusual collection in the Cacti and Succulent House. The taller one in the back is known as the prickly pear.

Since 1991, the Conservatory has been a receiving center for plant material confiscated by the Department of the Interior. These specimens have entered the United States without proper permits and are often endangered species. Rescue centers accept and hold such plants for 30 days, giving those who brought them in the opportunity to acquire proper permits. If the plants are abandoned, the rescue center keeps them permanently with the understanding that they can never be sold but can be propagated and shared with other botanical gardens. The Conservatory has elected primarily to receive cacti and succulents. This winter look for *Mammillaria candida, M. lloydii* and *Echinocactus horizonthalonius,* rescue program waifs recently planted in the Cactus House.

There are other striking specimens here, such as *Agave parryi* var.*truncata*, with leaves of a dusty green-gray color outlined in black, and purple fountain grass, *Pennisetum setaceum* 'Rubrum', with elongated, feathery, pink-purple flowers that seem to dance in the soft, warm air.

The Conservatory collection has grown so large that it can never be shown all at once. The Friends of the Conservatory, recognizing a community need for more information, has undertaken the creation of a resource center and small gift shop. Here, through the use of an interactive computer, it will be possible to view the entire portfolio of plants, to learn more about displayed plants and see examples of others in the collection. "Hotsheets," about what's blooming in each of the five houses, will be available, and guests will also be able to buy books and mementos of their visit to the Conservatory. Plans for the new structure, designed by project architect Brian Sweeney, call for materials and finishes that will be harmonious with the historic Conservatory. Look for its opening in 2002.

For 20 years Friends of the Conservatory has planned and delivered programs for the public at this most beautiful glass palace, a place that holds memories for many. Currently, the Conservatory hosts 12,000 visitors a month. Nevertheless, the quiet space never feels crowded. It is a perfect destination for those who need a bit of winter warmth and color.

Conservatory hours until Memorial Day are 10 a.m. to 4 p.m. A new Gardener-On-Duty program posts a gardener on the first Thursday of each month from 11 a.m. to noon to answer questions on specific topics including cacti and succulents, bromeliads, and orchids. For information and tour reservations, call the Friends of the Conservatory at (206) 322-4112. ~

Holly Redell is a writer and fundraiser. She is on the board of the Friends of the Conservatory.

A PUGET SOUND HARDY CACTUS GARDEN

PHOTGRAPHS & TEXT BY GEORGE PINYUH

Although the center of cactus evolution probably lies somewhere south of the Mexican border, and the majority of cacti native to the continental United States are likely to be found in the Southwest, many taxa can be grown and will thrive in western Washington gardens.

With the right conditions, super drainage and whatever passes for full sun in the maritime Northwest, a uniquely outstanding hardy cactus and succulent garden can be successful in this region.

Hardy Souls

To the surprise of most people, there is at least one species of cactus native to every one of the lower 48 states, with the apparent exceptions of Maine, New Hampshire and Vermont. A real desert is not necessary for many cacti, and in fact, one very hardy little

Opuntia compressa (syn. *O. humifusa*) thrives in the Pinyuh garden. Its bright yellow flowers arrive in late spring or summer and are followed by obovoid, edible, red or purple fruit.

cactus even grows and thrives in the vicinity of the Arctic Circle. This same species, *Opuntia fragilis*, can actually be found growing naturally in western Washington.

Opuntia fragilis, the brittle prickly pear, is still growing wild in parts of the San Juan Islands as well as in the vicinity of Sequim and Port Townsend. This cactus was more widely distributed before the time of European settlement, but habitat destruction, reforestation and the introduction of very aggressive, non-native grasses has unfortunately reduced it to smaller remnant colonies.

Many North American cacti and other succulent plants have evolved to grow at very high elevations in the West where they routinely endure temperatures well below zero each winter. In addition, there are species from the Great Plains, from Texas and Oklahoma all the way up into Canada, as well as from forested areas east of the Mississippi where rainfall equals or exceeds that of the Puget Sound. All of these cacti are used to enduring lower winter temperatures than are the norm here in western Washington.

Prickly Pears & Chollas

In my garden south of Seattle, I have been experimenting for a number of years with a wide array of species, their varieties and naturally occurring hybrids. Where the ranges of prickly pears (*Opuntia* species) and chollas (*Cylindropuntia* species) overlap, hybrid swarms are common. Other genera have also been found to hybridize readily in nature, and it is perhaps for this reason that the taxonomy of the Cactaceae is in something of a confused state.

Many taxa have grown extremely well for me, coming through our wet, cool, dark and dreary winters quite unscathed. They have had spectacular flowers, and in some cases, have even produced a few prickly pears. Low-growing cacti, such as *Opuntia fragilis, O. polyacantha* and *O. erinacea,* which tend to spread and grow not more than 18 inches wide and high, have produced flowers from yellow through pink and red as well as chartreuse, cream and nearly white.

There are other larger prickly pears that can grow perhaps 36 inches high and spread at least as wide. *Opuntia phaeacantha*, sometimes with pads 12 inches long or longer, is definitely my favorite, not only because of its wonderful persimmon-colored flowers, but also because of its sheer bulk. I like big plants of all sorts, and this cactus can get big. You'll definitely need space for this fellow, or the fortitude to keep it confined and under control.

Several other prickly pears, such as *Opuntia macrorhiza* and *O. basilaris*, also seem to possess the inclination to spread a bit, but they are not likely to become as tall as the previous species. All of these larger prickly pears have grown and flowered well, and in the case of *Opuntia phaeacantha*, even my living room may not be off limits.

The *Cylindropuntias*, or chollas, such as *C. whipplei, C. imbricata, C. kleiniae* and others, have all adapted well and show signs that our maritime environment will not inhibit their ultimate height of four feet or more. They do seem to grow more slowly than in hotter summer areas, but in the case of *C. whipplei*, flowering has occurred nonetheless.

Barrels & Other Companions

Some wonderful barrel cacti have also done extremely well; using them in a garden of succulents should complete the Southwest picture. The genus *Echinocereus*, known commonly as hedgehog cactus, has succeeded nicely, and since species don't grow too large, they fit easily in small spaces, gradually forming larger clumps. Some of those I grow are *E. coccineus, E. dasyacanthus, E. engelmannii, E. reichenbachii, E. triglochidiatus* and *E. viridiflorus*. Green, orange, red and purple flowers have appeared on those that have been cooperative.

Grusonia clavata (syn. *Corynopuntia clavata*), a low-growing member of the Opuntia group with sunny-yellow flowers, can also be grown successfully in western Washington.

Opuntia phaeacantha, the author's favorite, with brown areoles, sheathed, brown spines and persimmon-colored flowers, can grow to be three feet tall.

I also grow a number of globose, mammillary-type cacti that are either in the genus *Coryphantha* or *Escobaria*. These little cacti are rock-hardy. In fact, both *Escobaria vivipara* and *E. missouriensis* grow naturally all the way up into North Dakota and southern Canada. They have performed well and not only flowered, but, in some cases, are also producing pups and forming clumps.

To round out the barrels (not a pun) I have so far managed quite well with *Echinocactus texensis,* the famous "Texas Horse Crippler." One look at its spines ought to be enough to cripple any horse. It hasn't flowered yet, though.

Eastern Washington is host to several cactus species that have done very well for me over here on the wet side. *Opuntia erinacea* var. *columbiana* and other probably natural hybrids of *O. fragilis* and *O. polyacantha* are worth growing because of their local heritage. They haven't yet flowered for me, perhaps because some of the smaller prickly pears are shy bloomers. Even in hot climates, it often takes a while for them to bloom.

"...one very hardy little cactus even grows and thrives in the vicinity of the Arctic Circle."

There are many other plants that associate well with cacti, some succulent, some not. *Agave, Manfreda, Sedum, Sempervivum, Jovibarba, Yucca, Nolina* and *Hesperaloe* are other genera I grow in my Puget Sound garden.

Strategies for Success

To garden successfully with cacti in the maritime Northwest it is important to

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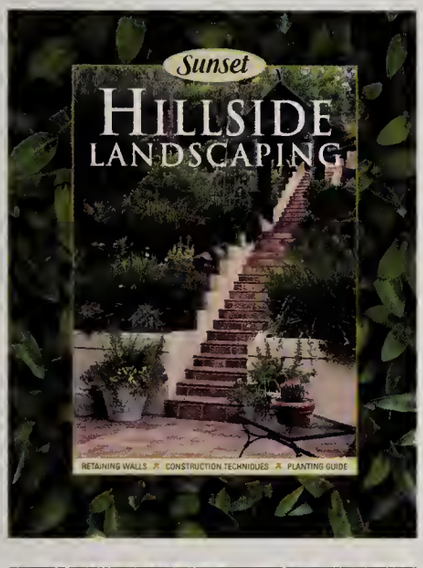

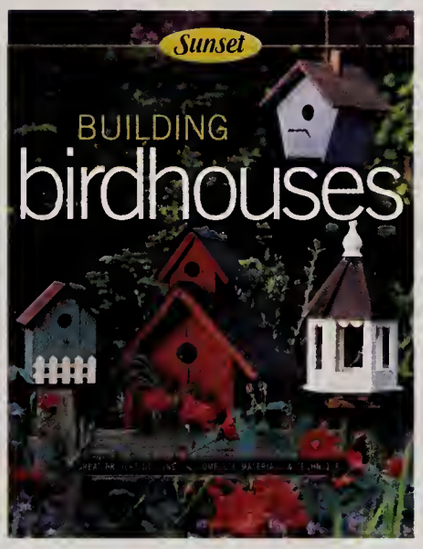

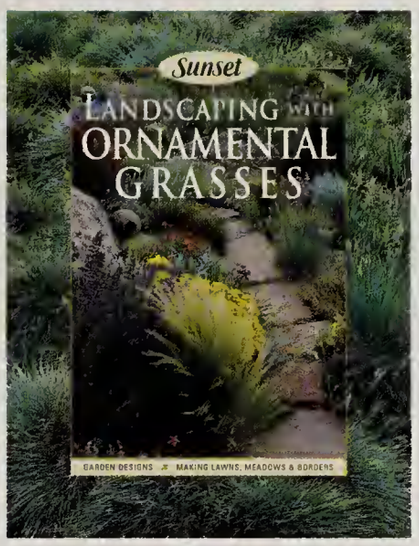

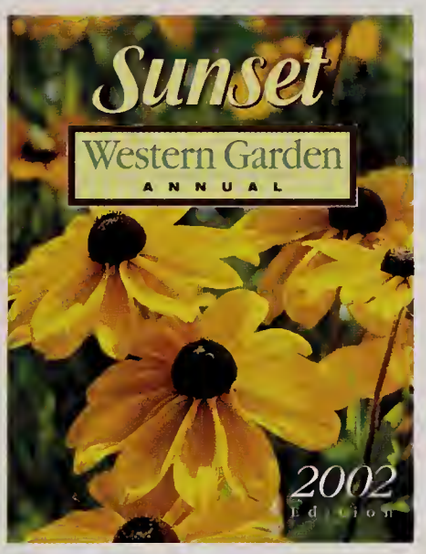

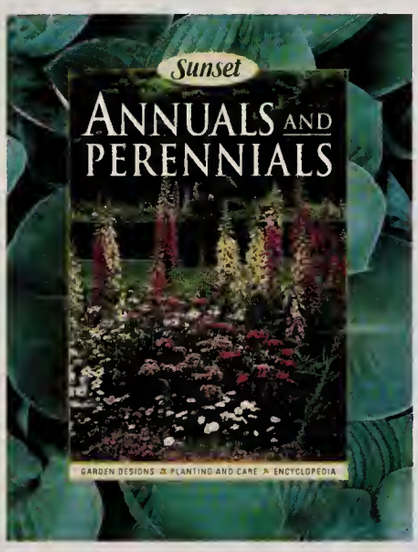

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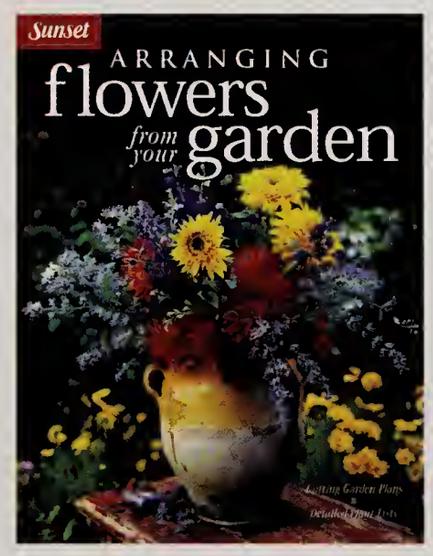

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duplicate the conditions our own little native *Opuntia fragilis* chooses for survival. Its strategies are fairly simple and straightforward. Locate your cacti in full sun, at least five to six hours of post-10 a.m. sun during spring and summer. When hardy cacti are dormant during fall and winter, sunlight seems not to be critical. How much sun is there in these parts during winter, anyway?

Extremely well drained soils are the norm where cacti are found wild in western Washington, and if sandy, gravelly soil does not exist naturally in your garden, it can be created. Cacti will not succeed long in clay or silty soils, or where water puddles and drains slowly after rain or irrigation.

Gardeners who grow hardy cacti in the ground in other cold, wet climates often succeed by building raised beds or elevated areas of coarse sand, gravel and humus. Drainage must be rapid, and so should drying.

Dumping six to 10 inches of coarse sand, pea gravel, three-quarter inch rock and/or even road gravel on top of the existing soil, can create such an environment. If you have access to lots of stones or rocks, they can be incorporated too. Organic matter in the form of peat moss, compost or leaf litter should complete the mix.

Using equal parts of sand and gravel with organic matter blended in should do the trick. Because cacti are for the most part shallow-rooted, great depth is not necessary. However, before laying your medium down it would be prudent to combine one to two inches of it with the existing soil to help create a transition layer.

In June of this past summer, I worked with Master Gardeners planting 10 cacti and an agave in the Washington State University Bellevue Demonstration Garden at 156th Avenue SE and SE 16th Street. Since then the plants have done well, and both they and the Master Gardeners would be pleased to have you visit.

For further reading and information, the following publications should be helpful:

Spain, John N. "Growing Winter Hardy Cacti in Cold/Wet Climate Conditions." E. Harmon, 1997.

Sierer, David. "Where the Hardy Cactus Grow." Amateurs' Digest, 1999.

Domico, Terry. "Brittle Prickly Pear Cactus (*Opuntia fragilis*) in the San Juan Islands and Puget Sound Region of Washington State." Douglasia Occasional Papers, Vol. 7, No. 1, pp. 37-50, 1999.

Benson, Lyman. "The Cacti of the United States and Canada." Stanford University Press, 1982.

George Pinyuh is Washington State University Extension Horticulture Agent Emeritus. He and his cactus garden may be reached at 253-631-6138.

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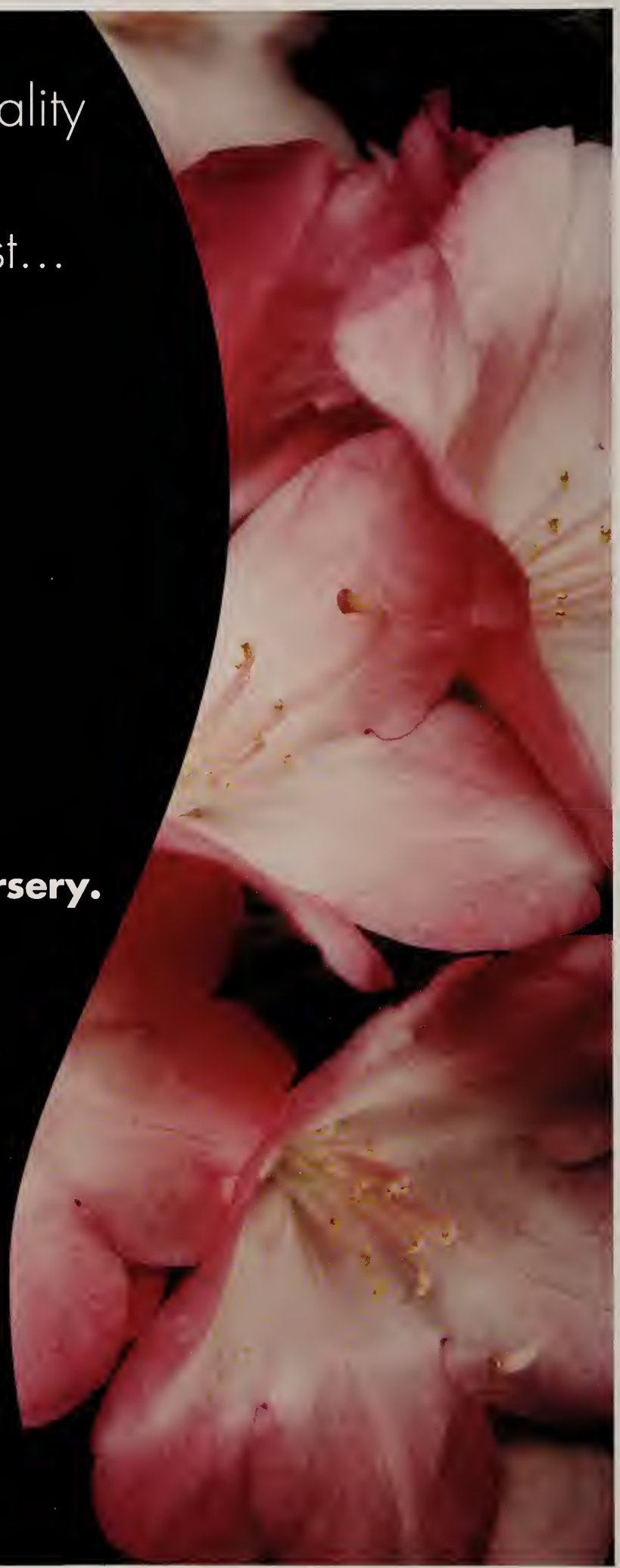

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Flights of Fancy? Maybe Not!

By Brian Thompson

Like many Northwesterners, I've done my fair share of escaping our sometimes-dreary winters in search of sun and warmth. And like many gardeners, I have flights of fancy, luring me to try my hand at choice floral treasures even less fond of wet and cold than I am.

From the American southwest come two excellent new books that can only intensify these desires. "The Cactus Family" and "Agaves, Yuccas, and Related Plants: A Gardener's Guide" have much in common. Both address long overdue gaps in the botanical and horticultural literature, and both are definitive reviews of groups of plants that are becoming more and more desirable as we seek less thirsty landscapes.

Lace cactus, *Echinocereus reichenbachii*

PHOTO BY GEORGE PINYUH

This is all well and good if you live in Phoenix, but what about Phinney Ridge? Ah, here is the challenge, but with careful reading, you will find much for the local plant lover. Many entries are excellent for pot culture and can move inside for the winter when you do, or spend their lives happily under lights or in bright windows.

There even are a few candidates worth trying in our gardens. But I found the greatest value of these writings in my increased appreciation for the gardens of cacti and other succulents seen on travels. Outstanding destinations include the Desert Botanical Garden in Phoenix, Arizona; the Huntington Botanical Gardens in San Marino, California; or even the fine collection at the Volunteer Park Conservatory (see page 20) here in Seattle.

The Cactus Family

Edward F. (Ted) Anderson's "The Cactus Family" truly is a life's work, not because of his untimely death just after publication, but because it is the product of more than 45 years of not only widely published research and study of cacti, but a keen personal interest in the family.

Each entry in the 500-plus page encyclopedia section includes a meticulous description and distribution account, then goes much further by providing the taxonomic path, common names from various languages and, typically, a photograph by the author. Each genus is introduced with a discussion of its taxonomic history, but this potentially dull material is always enlivened with interesting facts or anecdotes from the author's personal experiences with the subject.

While the scholarship is impeccable, Anderson demonstrates his ability as a writer in the essays of the initial three chapters on distinctive features of cacti, their ethnobotany and conservation. Typically, he notes, "to describe all impressive cacti I have seen would take a book..., this book, for I could not ignore the cactus forest of the valley of Tehuacán." He then adds several more impressive examples in word and picture.

The chapter on ethnobotany, an obviously favored study, could stand as a small book on its own and covers the range of uses for cacti as food, medicine, objects of worship, building materials and tools, and even as mind-affecting drugs. Equally intriguing are Anderson's

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accounts of ceremonial acts required for making wine from saguaro fruit, the all-night, healing rituals using the San Pedro cactus of South America, or the survey of the widely varying and colorful cactus fruits, known as tunas, found in a Mexican market.

The author's skill as a teacher, recognized by awards he received while Professor of Biology at Whitman College in Walla Walla, Washington, is demonstrated in his chapter on the classification of cacti. His step-by-step explanations, "taxa and their classification may be likened to boxes within boxes," should neither confuse the novice, nor bore the knowledgeable.

"The Cactus Family" attains a fine balance between the scientific accuracy and careful documentation required for the scholarly work that it is, and a readability and enjoyment for the less studied reader. Photographs, mostly by the author, are generous and excellent and will "hook" even the most casual reader. And while Anderson claims no expertise in cultivation, a chapter written by Roger Brown fills this need well.

Agaves, Yuccas and Related Plants: A Gardener's Guide

This volume is a wonderful companion for "The Cactus Family." Together they give a breadth of coverage to a group of plants with similar, climatic and ecological-niche preferences which have captured the imagination of many who may have little regard for other plants. All from the new world, their strange forms and unique qualities were truly exotic when introduced to European horticultural circles and stirred a fervor that has never diminished.

The important research and public outreach of the Phoenix Desert Botanical Garden helped foster both books. Mary Irish, who co-authored Agaves with her husband Gary Irish, was Director of Public Horticulture there from 1988 to 1999, while Ted Anderson was a Senior Research Botanist from 1992 until his death.

"Agaves, Yuccas and Related Plants: A Gardener's Guide," as the full title indicates, has much to offer. Each entry in its encyclopedia includes cultural requirements and suggestions that speak from experience: "does well in enriched garden soil" (*Agave ghiesbreghtii*), or "its very strong form dominates nearly any location" (*Dasylirion quadrangulatum*).

Although gardening in Phoenix, the authors demonstrate a keen awareness of the challenges found elsewhere with these plants that "as a group exhibit a puzzling array of resistance to cold." Numerous suggestions on stretching one's microclimate augment a handy chart of minimum temperatures for selected species. This is of particular interest for us in the Pacific Northwest, as many choice selections, especially amongst the yuccas, have considerable cold tolerance.

Many of the agaves are monocarpic, i.e., bloom once after a long life and then die, which can "can cause confusion, particularly to horticulturists and gardeners who tend to encounter the plants for years without the benefit of flowers." A high level of detail in describing the vegetative elements of each plant addresses this problem. So do the fine photographs of Gary Irish and the illustrations of Karen Bell; Bell's illustrations emphasize the individual features of these highly textural plants.

Seeing dozens of the tight, uniform and white-tipped rosettes of Agave victoriae-reginae or a grove of *Yucca filifera* towering over a garden visitor makes me want to pack my bags and head south. Either of these books may well put you in a similar mind.

Anderson, Edward F. "The Cactus Family." Portland, OR: Timber Press, 2001. ISBN: 0881924989, $99.95.

Irish, Mary and Gary Irish. "Agaves, Yuccas, and Related Plants: A Gardener's Guide." Portland, OR: Timber Press, 2000. ISBN: 0881924423, $34.95.

Brian Thompson is a librarian at the Elisabeth C. Miller Horticultural Library.

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